OPERATING MANUAL

1981 - 2001
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PX/512-2 SWITCH MATRIX

MAINFRAME

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PX/512-2 SWITCH MATRIX

MAINFRAME

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DRAWINGS

DRWG.#	DESCRIPTION
2-077-1	SIGNAL MOTHERBOARD
2-190-5	PS/12-5 POWER SUPPLY
3-101-1(SHTS.1&2)	PX/2X16 SWITCH MODULE, 2 POLE
3-102-2	PX/512 BACK PANEL CHASSIS SIGNAL CONNECTIONS
3-103	PX/512 CONTROL SIGNALS
6-013-3(SHTS.1&2)	RS232/IEEE488 CONTROL MODULE
6-057	LCD DISPLAY/KEYPAD MODULE
33-08-00	PX/512-2 MAINFRAME

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PX/512-2 SWITCH MATRIX MAINFRAME

INTRODUCTION

The CYTEC PX/512-2 Switch Matrix is a general purpose, programmable switch matrix that is built with two pole relays and which can be assembled in configurations as large as 32x16 or 64x8 within a single chassis. System specifications are presented in Appendix E. This manual contains detailed technical information and drawings, much of which is not required to operate the equipment. These details are included for those instances where additional design information may be needed, and it can serve as an invaluable tool in debugging problems of a technical nature. However, much of the following is certainly not required reading. With these facts fact in mind, we offer the following steps to get the equipment up and running as quickly as possible.

Getting up and running:

1. Unpack the unit and make sure it arrived physically undamaged. Many of the items listed separately on the shipping list are already installed within the chassis, rather than being packed separately.

2. Set up the unit and attach the AC power cord and the interface control cable (the interface cable may or may not be supplied with the unit depending on how it was ordered). Make sure that the front panel power LED lights when the back panel power switch is turned On. You are now ready to send Control Commands to the unit.

3. Study the Sections of this manual that deal with your particular interface, paying attention to the Command Syntax. A selection of programming examples are presented in Appendices at the end of the manual and provide a good structure to work from. Keep in mind that the demo programs are written to run the unit in a typical shipped configuration, and possibly a specific Control Module type as well. If you alter the configuration in any way, you may need to alter the demo program code before the program will function normally.

4. If the Optional Keypad with LCD Manual control has been installed on the front panel, go ahead an enter various commands (L for Latch, U for Unlatch, C for Clear, etc.) to see how the unit responds.

5. After you have installed a control cable, you can begin writing and testing useful code. **Always write and debug code thoroughly before hooking up live signals to the matrix!** This equipment gives you complete control over what is switched to where, and will not prevent you from making potentially harmful switching decisions.

If you have any problems getting the unit up and running, technical assistance is just a toll-free call away between 8:00 AM and 5:00 PM Eastern Standard time.

For Technical Assistance, Call 1-800-346-3117

1.0 PX/512-2 MAINFRAME

The PX/512-2 Mainframe is a 19" rack mounting chassis, 3.5" high and about 22" deep as shown on **Drwg. #33-08-00**. The chassis contains the PX/512 Control Motherboard **(Ref.9)**, the PX/512 Dual Signal Motherboards **(Ref. 2)** and the Power Supply **(Ref. 7)**. The Control and Signal Motherboards are arranged so that the PX/2X16 Switch Modules **(Ref. 3)** plug directly into both. The Control Module **(Ref.6)** plugs into the Control Motherboard and is cabled to the remote control interface connector(s) mounted on the rear panel.

1.1 CONTROL MOTHERBOARD

The PX/512 Mainframe is microprocessor controlled via the Control Module that plugs directly into the Control Motherboard (The Control Motherboard is shown schematically on **Drwg. #3-103**). The Control Module will be explained in greater detail in its own section later in this manual. The Control Motherboard busses all signals required to select, Open, Close or Read the status of the individual relays. The signals shown on **Drwg. #3-103** are further described as follows:

SIGNAL	FUNCTION
MOD-0	Module Select 0 and 8.
MOD-1	Module Select 1 and 9.
MOD-2	Module Select 2 and 10.
MOD-3	Module Select 3 and 11.
MOD-4	Module Select 4 and 12.
MOD-5	Module Select 5 and 13.
MOD-6	Module Select 6 and 14.
MOD-7	Module Select 7 and 15.
*MOD-8	Module Group Select 0 through 7.
MOD-8	Module Group Select 8 through 15.
DATA	Data to Module.
CLK	Input/Output Data Shift Clock.
LOAD	Set shifted Output Data to Relays.
SLOAD	Load Serial Output Registers.
STATUS-IN	Data In from Module.

1.2 SIGNAL MOTHERBOARDS

Each of the two Signal Motherboards, **Drwg. #2-077-1**, buses eight pairs of backplane signals. These signals then wire out to rear panel mounted connectors (BNCs, Screw Terminals or Headers). Every signal pair has integral ground separation to prevent crosstalk. For 32 X 16 operation, each Signal Motherboard wires out to eight rear panel connectors. For 64 X 8 operation, backplane signals 0 through 7 are paralleled with signals 8 through 15. Only 8 rear panel signal connections are provided for 64 X 8 operation.

1.3 REAR PANEL CONNECTIONS

The Signal Motherboards are internally wired-out to BNC, Screw Terminal or Header connectorss. The layout of the connectors on the chassis rear panel is shown on **Drwg. #3-102-2**. BNC style connectors are simply wired straight thru to the Signal Motherboards and are labeled accordingly.

1.4 POWER SUPPLY MODEL PS/12-5

The Model PS/12-5 is a dual Power Supply with a regulated +12 volt output for energizing the relays and a regulated +5 volt output for powering the electronic logic as shown in **Drwg.#2-190-5**.

The power supply will operate from 100-140 volts or 200-260 volts at 47-400 Hz. The line voltage is user selectable at the power entry module.

The power supply is wired to the Selectable AC Input Module on the rear panel, which also supplies the chassis's ON/OFF Switch. The user can select one of two AC voltage ranges: 110/120 Volts or 220/240 volts AC. To change the selected voltage, remove the fuse cartridge using a small blade screw driver of similar tool. Select the desired voltage by matching the arrow on the fuse cartridge to the arrow located on the Input Module's lower right corner. *Replace the fuse cartridge making sure the voltage selection arrow aligns with the arrow located on the Input Module.*

Two fuses are held in the fuse cartridge, with 220/240 VAC fused at 1.0 amp and 110/120 volts fused at 2.0 amps.

2.0 PX/2x16-2 SWITCH MODULES

The PX/2X16-2 Switch Module, Drwg. #3-101-1, sheets 1 and 2, provides 2x16 or 4x8 two pole signal switching. Signal switching is performed by hermetically sealed reed switches. All logic to address, select and read closed status is contained in this module.

2.1 CONTROL

Two basic operations are performed by this module. One is to latch or unlatch a selected relay and the second is to read the status of selected relays. A schematic of the switch module control logic and relay drives is shown on Drwg. # 3-101/1 (sheet 1).
Read operation is performed by reading all 32 relays at one time. The Open/Closed status from the relay drive signal is loaded into parallel to serial shift registers, SLOAD. The data is then shifted out by the CLK signal through the STATUS-IN line to the control module. Data may then be tested for individual open or closed status.
The write operation is performed by first reading the current state of an individual module, modifying the selected relay to be operated on and then shifting the new data back out to the module via the DATA and CLK signals. Once the data has been shifted out a LOAD signal is sent to load the shifted data to the relay drive lines. The new data is then re-read and the status saved by the control module as command completion data.
A clear operation is performed by addressing all modules simultaneously and shifting Open relay data to all positions.

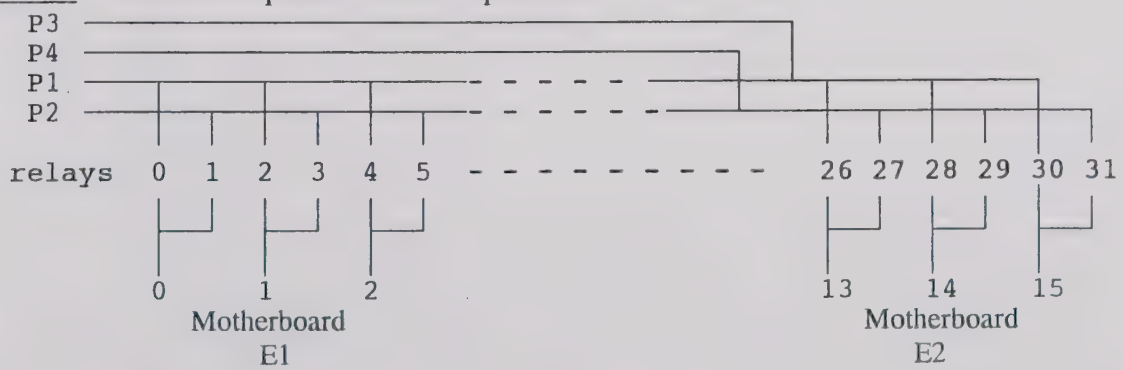
2.2 SIGNALS

A schematic of the signal wiring to the 32 relays is shown in Drwg.#3-101-1 Sheet 2.

Relays #0 through 15 are bussed to Input Connectors P1 and P2 and the Outputs are wired in pairs to Signal Motherboard E1 as outputs #0 through 7 as shown below. Similarly, Relays #16 through 31 are bussed to Input Connectors P3 and P4 and the Outputs are wired in pairs to Signal Motherboard E2 as outputs #8 through 15 as shown below.

The module can be supplied as a 2x16 Matrix using Inputs P1 and P2 with 16 outputs on the two motherboards. It can also be supplied as a 4x8 Matrix with Inputs P1, P2, P3, and P4 and the outputs on the two motherboards wired together 0 & 8, 1 & 9, 2 & 10, 3 & 11, 4 & 12, 5 & 13, 6 & 14, and 7 & 15 to give 8 outputs.

INPUTS - P3 and P4 Optional for 4x16 operation.



3.0 RS232/IEEE488 CONTROL MODULE

General

Cytec's RS232/IEEE488 Control Module, Schematic Drwg. #6-013 (sheets 1 and 2), is designed to control general purpose switching systems. Three forms of control are available on the module: Manual Control, RS232 and IEEE488. All three interfaces may be active and used simultaneously.

The control module also contains a non-volatile memory allowing the system to be configured for various matrix addressing combinations and remember that configuration. Interface controls for IEEE 488, Baud rate, answerback, echo, verbose and SRQ are also saved in this memory allowing these functions to be set-up once and restore those functions every time the power is turned on.

Control Module Styles

Interface options: RS232, IEEE488 and Manual Control must be specified when purchasing the switch system to allow for proper mounting and cabling of hardware and connectors.

The following control modules are described in this manual:

IF-3 RS232 Control Module
RS232 control.

IF-4 IEEE488 Talk/Listen Module
IEEE488 Talk/Listen control.

IF-5 IEEE488/RS232 Module
Includes both IEEE488 and RS232 control.

3.1 RS232 INTERFACE

Signal Connections

The control module is set-up at the factory to operate as Data Communications Equipment (DCE) per the EIA RS232D Standard. In this configuration the module transmits on pin 3 and receives on pin 2. Pin 4 is required to be high for the control module to transmit and pin 5 is output high by the control module to indicate a ready for data state and low when busy. Jumpers on the module allow for reversing the functions of these pins (2-3, 4-5) and operating as Data Terminal Equipment (DTE).

Pin	Signal	Function
1	GND	Ground.
2	TxD	Data in to Control Module.
3	RxD	Data out of Control Module.
4	RTS	Control Mod. requires +V to transmit.
5	CTS	Control Mod. provides +V when ready.
6	DSR	Control Mod. provides +V.
7	Common	Signal Ground.
8	RLD	Control Mod. provides +V.

The mating connector is type DB25S.

I/O Configuration

To configure the control module as Data Communications Equipment (DCE) the top two pin jumpers should be in the lower (closest to the card edge) position and the lower two jumpers should be in the upper position.

To configure as Data Terminal Equipment (DTE) the top two pin jumpers should be in the upper position and the lower two in the bottom position. This will reverse the functions of pins 2 and 3, and 4 and 5.

Baud Rate

Baud rate is set at the factory at 9600 Baud. Change is under software control and the control module must be connected to a serial interface to effect the change.

Baud	110	300	600	1200	2400	4800	9600	19200	38400
	0	1	2	3	4	5	6	7	8

Command: "R baud handshake 73"
"R 6 0 73" factory default.

If the Baud rate is inadvertently set to an unknown rate the default value may be restored. See the section on Setting Defaults for this procedure.

CTS/RTS Handshake

The Clear to Send, CTS, and Request To Send, RTS, functions may be modified by the 'R' command. The second entry of this command determines the operational status of these two lines. The least significant bit controls RTS and the next to least significant bit controls CTS. A binary 1 in those positions disables normal operation of that line.

Entry	Function
0	RTS(busy) and CTS(send) active
1	CTS(send) active, RTS always high.
2	RTS(busy) active, CTS ignored.
3	RTS always high, CTS ignored.

Command: "R baud handshake 73"
"R 6 0 73" factory default.

Stop Bits/Parity

The Matrix always transmits eight data bits and two stop bits, with the eighth bit sent as a Space. Reception is set for eight bits and one or two stop bits, the eighth bit is ignored. These values are fixed and may not be changed.

3.2 IEEE488 INTERFACE

Signal Connections

Per IEEE Std. 488.1-1987 specification.

Talk/Listen Address

The talk and listen addresses are the same and set by the five position DIP switch near the top edge of the control module. Setting is in binary, switch one being the least significant bit and five the most significant. Setting a switch to the on or closed position will indicate a zero value for that position. The factory default address is 7, switches 1, 2, 3 OFF, 4, 5 ON. With this setting the listen address signified by the apostrophe character (') and the talk address is signified by a 'G' character.

Device Subsets

The following list summarizes the device subsets implemented by the control module:

SH1	-	Source Handshake: Complete capability.
AH1	-	Acceptor Handshake: Complete capability.
T6	-	Talk Functions: Talk capability, Serial Poll, no talk only mode, untalk if MLA.
TE0	-	No Talker extended address capability.
L4	-	Listen Functions: Listen capability, no listen only mode, unlisten if MTA.
LE0	-	No Listener extended address capability.
SR1	-	Service Request: complete capability.
RL1	-	Remote Local: complete capability.
PP0	-	Parallel Poll: no capability.
DC1	-	Device Clear: complete capability.
DT0	-	Device Trigger: no capability.
C0	-	Controller: no capability.

SRQ Response

The service request function (SRQ) may be used to signal when the control module has completed an operation. The Program command (P) allows for enabling or disabling the SRQ response. When enabled the SRQ line will be set true when the control module has completed the last command received. The line will be set regardless of completion status.

P 1 0 73	SRQ off, no SRQ function. Default.
P 1 2 73	SRQ active and set true upon completion of each command.

Completion status may be read by a serial poll (SPE, MTA) or by enabling the talk address alone (MTA). After reading the status the SRQ line will be sent false.

Serial Poll, Talk Mode

Upon being addressed to talk the control module will return a single byte with EOI true indicating the switch-point and command completion status of the last matrix operation. If the previous command was for multi-character output (status, interrogate, revision ...) all data must be read before reading the command completion character. If the SRQ line was asserted it will be set passive false.

Char	Hex	Completion Status
'0'	30	Successful Operation, switch open.
'1'	31	Successful Operation, switch closed.
'2','3'	32,33	Unknown Command, the first character of the command string was unrecognizable.
'4','5'	34,35	Incorrect entries, the number or type of entries was incorrect.
'6','7'	36,37	Entries out of limits, a switch-point was requested that was outside the limits of the specified matrix.
'8','9'	38,39	Invalid access code, the code number 73 was not included or incorrect in a command requiring the access code or in the wrong entry position.
as above with SRQ true		
'p'	70	Success, Switch Open.
'q'	71	Success, Switch Closed.
'r','s'	72,73	Unknown Command.
't','u'	74,75	Incorrect entries.
'v','w'	76,77	Limits Error.
'x','y'	78,79	Access Error.

WARNING:
The control module will return a completion character any time it is addressed to talk. If the control module is currently executing a command the completion status of the previous command will be sent. It is strongly recommended that the SRQ function be enabled to provide positive indication of actual command completion.

Remote/Local Operation

The interface responds to the Go To Local (GTL) and Local Lockout (LLO) commands by enabling or disabling front panel controls. Response to LLO, GTL, and REN signals may be disabled by the Program command 'P 4 0 73' and enabled by 'P 4 1 73'. Enabling or disabling is stored in non-volatile memory and will not be affected by turning power off then on. Factory default is disabled. Factory default is disabled.

Device Clear, Selected Device Clear

The interface will respond to both device clear (DCL) and selected device clear (SDC) by clearing any pending operations, aborting pending output and optionally clearing the control module.

The matrix clear feature may be disabled by the Program command 'P 3 0 73' and enabled by the command 'P 3 1 73'. Enabling or disabling is stored in non-volatile memory and will not be affected by turning power off then on. Factory default is Disabled.

3.3 COMMAND LINE/COMPLETION

Command lines will be received by the control module but not executed till an end of line is signaled. Multiple commands may be entered on one line. Each command must be separated by a semi-colon (;). Command line length may not exceed 36 characters. Commands from the RS232 interface may be aborted at any time by sending an asterisk ('*') character. Commands from the IEEE488 interface may be aborted by the DCL/SDC bus command.

eg. "L 10 8;L 12 2" eol Close Module 10, Switch 8 then Close Module 12 Switch 2.

Format

Commands will be received by the RS232 port when the Clear to Send Signal is at +V and by the IEEE488 port after the listen address has been received (MLA). Matrix command strings consist of ASCII text strings terminated by an end message.

The command string will always consist of at least one ASCII character to indicate the operation desired. For matrix commands requiring data entry each entry must be separated by at least one space or comma character.

eg. "S eol"
"X 1 2" eol

End of Line Character

A received end of line character will cause the control module to execute the ASCII command string. The end of line character may be sent as a carriage return (CR) or line feed (LF) character for RS232 interfaces and a LF for IEEE488 interfaces.

The IEEE488 also allows for the END control line being true with the last data character to initiate the command.

Valid end of Lines:

CR	RS232 only.
CR and END	IEEE488.
LF	RS232 or IEEE488.
LF and END	IEEE488.
DAB and END	IEEE488.

Access Code

Some commands require an access code number to be included with the command. This code prevents inadvertent operation of system modifying commands. The access code is 73.

Command Completion

A code representing the last requested switchpoint status (open or closed) and command completion will be stored by the matrix.

If the RS232 answerback function is enabled a single character followed by end of line will be sent upon completion of all commands. With IEEE488 interfaces enabling the talk address (MTA) will cause the single code byte to be transmitted along with the END line true. This code is also available by a serial poll. DIO1 will indicate status from the last operation affecting switch-point status and DIO2 through DIO4 will be the command completion code.

> **Note: Command Completion is NOT updated until the matrix finishes the requested operation.**

Command Completion Codes

Char	Hex	Completion Status
'0'	30	Successful Operation, switch open.
'1'	31	Successful Operation, switch closed.
'2','3'	32,33	Unknown Command, the first character of the command string was unrecognizable.
'4','5'	34,35	Incorrect entries, the number or type of entries was incorrect.
'6','7'	36,37	Entries out of limits, a switch-point was requested that was outside the limits of the specified matrix.
'8','9'	38,39	Invalid access code, the code number 73 was not included or incorrect in a command requiring the access code or in the wrong entry position.

3.4 MATRIX COMMANDS

L,U,X - Latch, Unlatch, Multiplex Commands

Syntax: Cmd Switch
Cmd Module, Switch

Cmd = 'L', 'U' or 'X'.

The specified switchpoint is operated on.

L - Latch Closes the specified point, all others unaffected.
U - Unlatch Opens the specified point, all others are unaffected.
X - Multiplex Opens all points in the specified matrix then closes the specified point.

Eg. "L 1" Switch 1 is closed. (Uses previous Module value.)
"U 5,3" Module 5, Switch 3 is opened.
"L 0,1" Module 0, Switch 1 is closed.

C - Clear Command

Syntax: C

All points in the chassis are opened.

Eg. "C" All switches in the chassis are opened.

S - Status Command

Syntax: S
S Module, Switch

Status may be requested of a single switchpoint or for the entire chassis. After receipt of the Status command the Matrix will return a character or string of characters representing the status, open or closed, of a switchpoint or switchpoints. A one, '1', signifies a closed switchpoint and a zero, '0', an open switchpoint.

In the case of a single switchpoint a single character is returned followed by an end of line. For multiple switchpoints a line of ones and zeros will be returned for each switch row in the matrix. Each line returned will be followed by a end of line for RS232 interfaces and a semi-colon, ';', for IEEE488 interfaces. At the end of all output rows an end of line will be sent for both interfaces.

Eg. 1

Send:	"S 3,4"	Test Module 3, Switch 4
Receive:	"0" eol	Switchpoint open, end of line.

Eg. 2, A 16 Module, 8 Switch Matrix shown in this example.

Send:	"S"	Status of chassis
Receive:	"0001000100000000" eol	
	"0000000000000000" eol	
	"1111111111111111" eol	
	" "	
	" "	
	"1010101010101010"	

The above status indicates:
Line 1 - Switch 0, Module 3 and 7 closed.
Line 2 - Switch 1, none closed.
Line 3 - Switch 2, all closed.
Line 7 - Switch 7, even Modules closed.

Notes - RS232:

1. The end of line will be a carriage return with Echo disabled or a carriage return and line feed if Echo is enabled.
2. If Answerback is enabled the answerback character and end of line will follow the status output.

Notes - IEEE488:

1. The end of line character will be a line feed.
2. A DCL or SDC command will abort output.

Notes - both interfaces:

1. Upon requesting status output characters MUST be received by the requesting device. Failure to do this will prevent further use of the matrix.

I - Interrogate

Syntax: I

The Interrogate function will return a list of all closed switchpoints.

Eg.

Send: "I"		Request interrogation.
receive:	"0,0" eol	Module 0, Switch 0 Closed.
	"1,6" eol	Module 1, Switch 6 Closed.
	"12,13" eol	Module 12, Switch 13 Closed.

Notes - RS232:

1. The end of line will be a carriage return with Echo disabled or a carriage return and line feed if Echo is enabled.
2. If Answerback is enabled the answerback character and end of line will follow the interrogate output.

Notes - IEEE488:

1. The end of line character will be a line feed.
2. A DCL or SDC command will abort output.

Notes - both interfaces:

1. Upon requesting interrogation all characters MUST be received by the requesting device. Failure to do this will prevent further use of the system.

F - Front Panel

Syntax: F n 73 n = 0 or 1

Front panel lock-out will be initiated by the receipt of a 0 character and enabled by the receipt of a 1 character followed by the access code. The access code prevents inadvertent lock-out from occurring. Lock-out will prevent any operation of the system from the front panel until it is terminated from the remote (F 1) or power is turned off then on. Preset to panel enabled at power on.

Eg.	"F 0,73"	Lock-out local operation.
	"F 1 73"	Enable local operation.

T - Diagnostic Test

Syntax: T 0, Delay, 73

Perform diagnostic test. The matrix will cycle through all switchpoints until any command is received by the initiating device (RS232/IEEE488). The received command will NOT be executed only the test will be stopped. A delay variable (0 to 255) allows slowing of the switch-point time with 0 being the fastest cycle time. The access code, 73, prevents inadvertent activation of the diagnostic.

Eg. "T 0,100,73" Test matrix. Delay 100 per point.

P - Program

Syntax: P n1,n2,73

The program command allows the operator to setup matrix dependent variables. These include matrix switch configuration and certain interface functions. See section Matrix Programming for complete description.

N - Revision Number

Syntax: N

The 'N' command will cause the matrix to return it's current revision number and setup information followed by an end of line.

Eg. Send: "N" Request revision Number
Receive: "4.3, Standard Conversions" eol Text string indicating revision.

Note: When requesting the Revision number all characters must be received before the system can be resumed.

3.5 RS232 SPECIFIC MATRIX COMMANDS

R - Baud Rate, RTS/CTS Control

Syntax: R rate control 73

The R command is used to set the Baud rate and RTS/CTS functions for the RS232 port. After issuing the command the matrix must be turned off then on to initialize the new rate. Both entries are required.

1st Entry	Baud Rate
0	110
1	300
2	600
3	1200
4	2400
5	4800
6	9600
7	19200

2nd Entry	Function
0	RTS(busy) and CTS(send) active
1	CTS(send) active, RTS always high.
2	RTS(busy) active, CTS ignored.
3	RTS always high, CTS ignored.

Eg. "R 1 0 73" Set Baud rate to 300.
Enables CTS and RTS Functions.

A - Answerback

Syntax: A n 73 n = 0 or 1

Answerback will enable or disable the transmission of a single character followed by an end of line upon the completion of all commands.

Eg. "A 0 73" Turn answerback off.
"A 1 73" Turn answerback on.

E - Echo

Syntax: E n 73 n = 0 or 1

Echo will enable or disable echoing of all received characters. In addition a line feed character will be transmitted upon receipt or transmission of a carriage return character.

Eg.	"E 0 73"	Turn echo off.
	"E 1 73"	Turn echo on.

V - Verbose

Syntax: V n 73 n = 0 or 1

The verbose mode will enable the instrument to return text strings during operation and upon completion of matrix commands. It is most useful when connecting a terminal or computer in the terminal mode to the matrix. Verbose must be active to acquire help text and interactive program set-up.

Eg.	"V 0 73"	Turn verbose mode off.
	"V 1 73"	Turn verbose mode on.

H - Help

Syntax: H

The matrix contains a help menu which summarizes all commands. It may be accessed only on the RS232 interface when verbose is enabled.

Eg.	"H"	Display help screens.

3.6 MATRIX PROGRAMMING/SETUP, P COMMAND

The matrix command program (P) allows the operator to set matrix dependent parameters and certain interface functions. The control module is designed to be of general purpose use and is "trained" as to the number of switchpoints and their usage in the system. Certain interface functions may also be modified to allow easier communications to other equipment.

The Configuration appendix summarizes matrix configuration.

P 0 - Number of Matrices

Syntax: P 0 1 73

Always set to 1.

Eg. "P 0 1 73"

P 1 - Set IEEE488 SRQ Function

Syntax: P 1 mode 73 mode = 0 or 2

Mode 0 - SRQ not used.
Mode 2 - SRQ signals command completion.

Eg. "P 1 2 73" Sets SRQ operation to mode 2.

P 2 - Specify Matrix Size

Syntax: P 2 n 73 n = 0, 1 or 16

Four standard matrix sizes are available with the 6-013 module: 64, 128, 256 and 512. This information must be provided to properly control the hardware.

n = 0 - 64, 128 Relays: LX, CX, RJ. . . series.
1 - 256 Relays VX series.
16 - 512 Relays: PX series.

Set to 1 for VX256 style chassis.

Eg. "P 2 1 73" VX256 Style Chassis.

P 3 - IEEE488 Enable/Disable DCL/SDC Function

Syntax: P 3 n 73 n = 0 or 1

Enables or disables response to the IEEE 488 Device Clear and Selected Device Clear commands.

Eg. "P 3 0 73" Disable DCL/SDC functions.
"P 3 1 73" Enable DCL/SDC functions.

P 4 - IEEE488 Enable/Disable LLO/GTL Function

Syntax: P 4 n 73 n = 0 or 1

Enables or disables response to the IEEE 488 Local Lockout and Go To Local commands.

Eg. "P 4 0 73" Disable LLO/GTL functions.
"P 4 1 73" Enable LLO/GTL functions.

P 9 - Chassis Information

Syntax: P 9 n 73

The P 9 function is used to modify specific matrix operating parameters. Entry is weighted binary where desired features are summed and entered as a single variable.

Multiplexer operation is not covered in this manual. Please consult the factory if multiplexer operation is desired.

Function	Weight	Description
Mux Mode	1	consult factory.
Dual Mux	2	consult factory.
Dec Entries	4	Address points from 1 instead of 0.
Horz. Split	8	consult factory.
Vert. Split	16	consult factory.
JX-4AB	32	consult factory.
Dual 8	64	consult factory.
De-Mux	128	consult factory.
CL2	256	CL2 Modules.
CL4	512	CL4 Modules.
Row Lock	1024	Allows only one point in any one switch row.
Col Lock	2048	Allows only one point in any one switch column.
Vert. Inc.	4096	Always count down then over when multiple inputs per module. Otherwise count over then down.

P 10 - Set Logical Number of Modules

Syntax: P 10 Modules 73

The P 10 sets the logical number of modules. The logical number modules refers to the horizontal signal addressing for the matrix and not necessarily to physical switch modules in the chassis. For example the LX series matrices (16 module, 8 switches) may be set up to be addressed as a 16 X 8, 32 X 4 or 64 X 2 matrix.

This entry also affects how the status array is presented, determining the number of columns transmitted.

Eg 1. "P 10 16 73" 16 Addressable Modules.
Eg 2. "P 10 32 73 32 Addressable Modules.

P 20 - Set Logical Number of Switches

Syntax: P 20 Switches 73

The P 20 set the logical number of switches. The number of logical switches refers to the vertical signal addressing for each matrix and not necessarily to the physical switch modules in the chassis. For example the LX series matrices (16 module, 8 switches) may be set up to be addressed as a 16 X 8, 32 X 4 or 64 X 2 matrix.

This entry also affects how the status array is presented, determining the number of rows transmitted.

Eg. "P 0 2 73" Set number of matrices to 2.
"P 20 8 73" Set matrix 1 for 8 addressable switches.
"P 21 32 73" Set matrix 2 for 32 addressable switches.

P 3x - Thumbwheel Positions

Syntax:	P 30 0 73	Set to 0.
	P 31 2 73	Module thumbwheel positions.
	P 32 1 73	Switch Thumbwheel positions.

Thumbwheel positions are programmed in weighted binary (1, 2, 4, 8 . . .) corresponding to the rightmost (1) to leftmost (8) thumbwheel position. If two thumbwheels are used the two binary numbers are added.

Eg. Set Switch selection for the rightmost thumbwheel (1) and Module selection as the next two thumbwheels (2 + 4).

P 31 6 73
P 32 1 73

3.7 MATRIX COMMAND SUMMARY

COMMAND	FUNCTION
L sw L mod, sw	Latch switchpoint.
U sw U mod, sw	Unlatch switchpoint.
X sw X mod, sw	Multiplex switchpoint.
C	Clear entire system.
S S mod, sw	Return status.
I	Interrogate Closed Points.
F 0/1 73	Disable/Enable Front Panel.
T 0 delay 73	Test matrix.
P parameter value 73	Program parameter.
N	Revision Number

RS232 Specific Commands

R baud, RTS/CTS 73	Baud Rate, RTS/CTS operation.
A 0/1 73	Disable/Enable Answerback.
E 0/1 73	Disable/Enable Echo.
V 0/1 73	Disable/Enable Verbose.
H	Help (verbose required).

3.8 DEFAULT CONFIGURATION SETTINGS

Should the non-volatile memory fail on the system default setup parameters will be placed in memory on power up. The unit may then be properly set-up by P commands.

Forcing Defaults

Default values may be forced by setting the IEEE488 listen/ talk address to all ones and turning power on. This is an illegal address and should be changed back to the proper address immediately. A legal address must be set before turning power back on or defaults will be set.

Default Values

P	0	1	One Matrix.
P	1	0	SRQ function off.
P	2	1	VX Style Chassis.
P	3	0	DCL/SDC disabled.
P	4	0	LLO/GTL disabled.
P	9	0	Standard Matrix Operation.
P	10	16	16 Logical Modules.
P	20	16	16 Logical Switches.
P	30	0	No Chassis thumbwheel.
P	31	6	Module left one or two positions.
P	32	1	One Relay thumbwheel.
E	0		Echo off.
V	0		Verbose off.
A	1		Answerback on.
R	6	0	Baud rate 9600, DTR and CTS active.

Appendix A - Shipped Configuration

This matrix system was setup with the following Program (P) commands (all commands were followed by the access code 73):

P 0 _1_ # of matrices.

P 1 _0_ SRQ Function none - command completion.

P 2 _16_ VX/PX Chassis 0 - LX/CX, 1 - VX/JX 16 - PX

P 3 _0_ DCL/SDC enabled - disabled.

P 4 _0_ LLO/GTL enabled - disabled.

P 9 _0_ Chassis Info.

P 10 _64_ # of Logical Modules.

P 20 _8_ # of Logical Switches.

E _0_ Echo on - off.

V _0_ Verbose on - off.

A _1_ Answerback on - off.

R _6_ _0_ Baud rate 9600,

DTR active - inactive,

CTS active - inactive.

Appendix B - GWBASIC/IEEE 488 Test Program

```
10 'Cytec Matrix Test Program using National Instruments IEEE488
20 '      Interface
30 CLEAR    ,60000!   'BASIC Declarations
40 IBINIT1 = 60000!: IBINIT2 = IBINIT1 + 3
50 BLOAD "bib.m",IBINIT1
60 CALL IBINIT1(IBFIND,IBTRG,IBCLR,IBPCT,IBSIC,IBLOC,IBPPC,IBBNA,
  IBONL,IBRSC,IBSRE,IBRSV,IBPAD,IBSAD,IBIST,IBDMA,IBEOS,IBTMO,
  IBEOT,IBRDF,IBWRTF)
70 CALL IBINIT2(IBGTS,IBCAC,IBWAIT,IBPOKE,IBWRT,IBWRTA,IBCMD,
  IBCMDA,IBRD,IBRDA,IBSTOP,IBRPP,IBRSP,IBDIAG,IBXTRC,IBRDI,
  IBWRTI,IBRDIA,IBWRTIA,IBSTA%,IBERR%,IBCNT%)
80 'Initialize GPIB Parameters : Clear Data Lines : Set Timeout
90 BDNAME$ = "gpib0"
100 CALL IBFIND(BDNAME$,BRD0%):CALL IBSIC(BRD0%)
110 V%=1: CALL IBTMO(BRD0%,V%)
120 MATRIX$ = "dev0": CALL IBFIND(MATRIX$,MATRIX%)
130 PRINT "Clearing Matrix": CALL IBCLR(MATRIX%)
140 PRINT "Multiplex Test": LET L$ = "X":GOSUB 230
150 PRINT "Latch Test":     LET L$ = "L":GOSUB 230
160 PRINT "Unlatch Test":   LET L$ = "U":GOSUB 230
170 PRINT "Status Test": GOSUB 310
190 V%=0: CALL IBSRE(BRD0%,V%) 'Turn Manual Controls back on
200 END
210 '-------------------------------------------------------
220 'Looping Through Matrix Executing Mux, Latch or Unlatch Commands
230 FOR Y = 0 TO 15   'Loop For Selecting Input              'typ 32 for PX512
240    FOR X = 0 TO 7    'Loop For Selecting Output         'typ 16 for VX256 and PX512
250       'Write Instruction To Matrix (Command,Input,Output)
260       WRT$ = L$ + STR$(Y) + STR$(X):CALL IBWRT(MATRIX%,WRT$)
270    NEXT X
280 NEXT Y
290 RETURN
300 '-------------------------------------------------------
310 'SAMPLE STATUS SUBROUTINE
320 WRT$ = "L 0 0":CALL IBWRT(MATRIX%,WRT$)  'Latch Random Switches
330 WRT$ = "L 1 1":CALL IBWRT(MATRIX%,WRT$)
340 WRT$ = "L 2 2":CALL IBWRT(MATRIX%,WRT$)
350 WRT$ = "L 1 5":CALL IBWRT(MATRIX%,WRT$)
360 WRT$ = "L 0 7":CALL IBWRT(MATRIX%,WRT$)
380 ' Single Point Status Test
390 WRT$ = "S 0 7": CALL IBWRT(MATRIX%,WRT$)
400 RD$ = SPACE$(255): CALL IBRD(MATRIX%,RD$)
410 IF MID$(RD$,1,1) < > "1" THEN PRINT "Status Error."
430 'Read status of entire Matrix
440 WRT$ = "S": CALL IBWRT(MATRIX%,WRT$)
450 RD$ = SPACE$(255): CALL IBRD(MATRIX%,RD$)
460 FOR I =1 TO 120 STEP 17
470       PRINT MID$(RD$,I,16)
480 NEXT I
490 RETURN
```

Appendix C - GWBASIC/RS232 Test Program

```
10 'Cytec Matrix Test Program for IBM-PC Compatibles using GWBASIC 20 'and COM1 port.
30 '    Matrix should be set up for:
40 '            E 0 73      Echo off
50 '            V 0 73      Verbose off
60 '            A 1 73      Answerback on
70 '    Set-up may be done by any Terminal emulation program or
80 '    by adding these lines to the program, be sure to clear
90 '    input buffer after set-up.
100 'The Answerback character is read after every write operation, 110 'and can be tested for successful
operation if desired.
120 '
130 OPEN "COM1:9600" AS #1
140 COM(1)ON
150 PRINT "Clearing Matrix": PRINT #1,"C": INPUT #1, A$
180  PRINT "Multiplex Test": LET L$ = "X":GOSUB 260
190  PRINT "Latch Test":     LET L$ = "L":GOSUB 260
200  PRINT "Unlatch Test":   LET L$ = "U":GOSUB 260
210  PRINT "Status Test": GOSUB 350
220 CLOSE #1
230 END
240 '-------------------------------------------------------
250 'Looping - Executing Mux, Latch or Unlatch Commands
260 FOR Y = 0 TO 15   'Loop For Selecting Input
270    FOR X = 0 TO 7    'Loop For Selecting Output
280       'Write Instruction To Matrix (Command,Input,Output)
290       PRINT #1, L$ + STR$(Y) + STR$(X): INPUT #1, A$
310    NEXT X
320 NEXT Y
330 RETURN
340 '-------------------------------------------------------
350 'SAMPLE STATUS SUBROUTINE
370 PRINT #1,"L 0 0": INPUT #1, A$ 'Latch Random Switches
380 PRINT #1,"L 1 1": INPUT #1, A$
390 PRINT #1,"L 2 2": INPUT #1, A$
400 PRINT #1,"L 1 5": INPUT #1, A$
410 PRINT #1,"L 0 7": INPUT #1, A$
420 'Single point status test
430 PRINT #1,"S 0 7": INPUT #1, S$: INPUT #1, A$
440 IF S$ < > "1" THEN PRINT "Error switch not closed."
460 ' Request Status of entire matrix
470 PRINT #1,"S"
480 FOR I = 0 TO 7
490       INPUT #1, S$
500       PRINT S$
510 NEXT I
520 INPUT #1, A$  'don't forget answerback character
530 RETURN
```

Appendix D - Turbo C/IEEE488 Test Program

```
/* Cytec Matrix / National Instruments IEEE488 Test Program          */
/*      This program was compiled under TURBO C ver. 2.0 and linked */
/*      with National Instruments file: TCIBS.OBJ.  Though not      */
/*      tested with other compilers it has been written following   */
/*      ANSI C rules and should be compatible with other compilers. */
/*      National Instruments configuration program IBCONF was used  */
/*      to assign dev7 listen and talk addresses of the matrix (7). */
#include <stdio.h>
#include "decl.h"

static int brd0, matrix; /* device ID variables */
static char cmd_line[10];
/* ------------ initialize I/O ---------------------------- */
int init_GPIB()
{
        if ((brd0 = ibfind("gpib0")) < 0)       /* 'Find' devices      */
                return(1);                                  /* that were setup by   */
        ibsic(brd0);                                    /* IBCONF program       */
        if ((matrix = ibfind("dev7")) < 0)      /* dev7 setup for Matrix */
                return(2);
        matrix_clear();
        return(0);
}
/* ------------ clear matrix ------------------------------ */
int matrix_clear()
{
        ibwrt(matrix,"C",1);            /* "C", alternate methods of  */
/*      ibcmd(brd0,"\x14",1);     DCL, clearing the matrix   */
/*      ibclr(matrix);            */
}
/* ------------ switchpoint operation --------------------- */
int switchpoint_operation(cmd, inp, outp)
int cmd, inp, outp;
{
        int     sp_status;

        sprintf(cmd_line,"%c%d %d", cmd, inp, outp); /* build   */
        ibwrt(matrix,cmd_line,strlen(cmd_line));   /* and send  */
        ibrsp(matrix,&sp_status);
        return(sp_status & 0x3f);       /* ret status less SRQ bit   */
}
/* ------------ switchpoint status ------------------------ */
int switchpoint_status(inp, outp)
int inp, outp;
{
        sprintf(cmd_line,"S%d %d", inp, outp);          /* Request status  */
        ibwrt(matrix,cmd_line,strlen(cmd_line));
        ibrd(matrix,cmd_line,10);               /* and read        */
        return(cmd_line[0] & 0x3f);
}
```

```
/* ************************************************************ */
#define N_INPUTS 16
#define N_OUTPUTS 8
#define RCV_BUFFER_SIZE N_INPUTS * N_OUTPUTS + N_INPUTS + 1

int main()
{
        int i,inp,outp;
        char rcv_buffer[RCV_BUFFER_SIZE];

        printf("Cytec Matrix Test Program.\n\n");

        /* initialize and trap errors */
        if (init_GPIB()) {
                printf("Initialize error.\n");
                return(1);
        }

        /* Latch & Unlatch Switches */
        for (inp=0; inp<N_INPUTS; inp++)
                for (outp=0; outp<N_OUTPUTS; outp++) {
                        if (switchpoint_operation('L',inp,outp) != '1')
                                printf("Error: point %d %d not closed.\n",
                                        inp,outp);
                        if (switchpoint_operation('U',inp,outp) != '0')
                                printf("Error: point %d %d not open.\n",
                                        inp, outp);
        }

        /* Latch 'Random' switches */
        for (outp=0; outp<N_OUTPUTS; outp++) {
                switchpoint_operation('L',outp,outp);
                /* direct status read */
                if (switchpoint_status(outp,outp) != '1')
                        printf("Error: point %d %d not closed.\n",outp,outp);
        }

        /* request status of entire matrix */
        ibwrt(matrix,"S",1);
        ibrd(matrix,rcv_buffer,RCV_BUFFER_SIZE);

        /* display status */
        printf("Bytes read = %d.\n",ibcnt);
        for (i=0; i<ibcnt; i++) {
                if (rcv_buffer[i] == ';')
                        printf("\n");
                else
                        printf("%c",rcv_buffer[i]);
        }
        ibloc(matrix);  /* Leave local controls enabled when done */
}
```

Appendix E - Product Specifications

Power: 100 - 120 Volts AC or 200 - 240 Volts AC, 50 to 60 Hz, 100 W.

Environmental: Operating temperature 0° to 50° C.
Storage temperature -25° to 65° C.

Cycle Time: Time required to select, latch and return status = 30ms.

Frequncy Specs.[1]

Bandpass: DC to 30 MHz.
Isolation: -60 dB at 1 MHz.
Crosstalk: -60 dB at 1 MHz.

Relay Specs.

	Type S (standard)	Type M (mercury)	Type LT (low-thermal)
Contact Rating	10 Watts	50 Watts	10 Watts
Maximum Switched Voltage	200 V	500 V	100 V
Maximum Switched Current	0.5 A	1.0 A	0.2 A
Maximum Carry Current	1.2 A	3.0 A	0.3 A
Breakdown Voltage	300 V	1000 V	200 V
Contact Resistance	.200 ohms	.070 ohms	.200 ohms
Life Expectancy(operations)	10^{10}	10^{10}	10^{10}
Operate time	1ms	3ms	1ms

Power Usage: +5 Volts - Less than 1 Amp.
+12 Volts - .020 Amps per energized relay.

1. All test measurements are on a full chassis of 16 modules with 50 ohm source and 50 ohm termination.

APPENDIX F - LCD DISPLAY/KEYPAD OPTION

The keypad/display option, **Drwg.#6-057**, allows manual control of the matrix from the front panel. Keypad operation is always enabled at power on but may be disabled by the remote command, 'F'.

DISPLAY

The display contains two lines with sixteen characters per line. The top line displays matrix commands and numeric entry. The bottom line displays the status of the entry or operation.

KEYPAD

The keypad consists of ten numeric keys, four function keys, a space key and an enter key.

Key	Function
0-9	Numeric entries.
space	Delimits between numeric entries.
L	Latch operation.
U	Unlatch operation.
X	Multiplex operation.
C	Clear operation.
ENTR	Execute displayed operation.

OPERATION

A matrix command key, L, U, X or C, MUST be pressed before numeric entry keys. Pressing any key except a matrix command key causes the message Enter Cmd First to be displayed. After pressing a matrix command key, the command and a cursor are displayed. The switchpoint to be operated on may now be entered with the numeric and space keys. The entry format is the same as described in the MATRIX OPERATION section and described briefly by the following table:

Command Key	Display Line 1	Line 2
L	Lat _	Enter Point
U	Unl _	Enter Point
X	Mux _	Enter Point
C	Clr _	Enter Matrix

The numeric keypad now allows selection of the Matrix, Module and Relay to be operated on. Each entry may be multiple digits and a space must be pressed between selections.

Key	Line 1	Line 2
L	Lat _	Enter Point
1	Lat 1_	
space	Lat 1 _	
2	Lat 1 2_	
3	Lat 1 23_	
space	Lat 1 23 _	
4	Lat 1 23 4_	

Number of Entries	Leftmost Entry	2nd Entry	Rightmost Entry
1	Relay	-	-
2	Module	Relay	-
3	Matrix	Module	Relay

CYTEC CORP.
2555 Baird Road, Penfield, New York 14526 • (716) 381-4740 • Fax: (716) 381-0475

MAINTENANCE

PX SERIES MATRICES

GENERAL

The PX Series of Matrix Systems have solid state controls and reed relay switching with feedback of the relay Status. The units are burned in to eliminate marginal solid state devices and the relays which have hermetically sealed contacts are cycled thru 100,000 operations and individually checked for contact deterioration.

No maintenance should be required before 100 million operations if the switches are operated within their rated VA, Voltage and Current.

Almost all reed failures are due to excess current being switched, and this usually occurs when the signals are wired incorrectly or the wrong relay is closed by the program. To reduce the probability of the kind of fault, all wiring to the modules should be thoroughly checked, and the program should be debugged without any power applied to the switches.

TROUBLESHOOTING

The Status Mode gives a simple method of checking the matrix operation, and a program is supplied so that the computer can operate each switch and check that the coil is energized. This program latches each switch in turn, checks for status, unlatches each switch in turn, and checks for status, then multiplexes each switch in turn, and checks for status. Any error will be flagged by the computer.

No Switches Operating

The power should be checked by the Power LED on the front panel, and by measurements directly on the motherboard. Check the fuse. If power is available at the motherboard, then the control module or control inputs are most likely to be at fault. These should be checked. If an IEEE488 Module is being used, then make sure the Listen Address is set correctly. Similarly, with RS2332, the baud rate must be correct.

Relay Modules Not Operating

Complete failure of a Relay Module can be caused by the Module Select from the Control Module or by logic failure on the Relay Modules.

The Module can be checked by replacing it by a known operating Module (either a spare or from another slot). If the replacement module does not operate, then the problem is in the Control Module drive to that Relay Module.

As the Relay Module has 4 sets of 8 relays, then complete failure of one section is associated with the logic for that section and can be verified by replacing the module.

Individual relay failures detected by the Status return feature indicate a failure in the logic and the Driver IC to that particular relay must be changed.

If the Status indicates that the relay is energized, but the contacts are not operating, then the relay is at fault and must be replaced.

REPAIRS

If a Module fails during the warranty period, it should be returned to CYTEC for repair or replacement.

Modules out of warranty or that fail for reasons not included in the warranty can be returned to CYTEC for repair at a reasonable price which will include another 5 year warranty.

Repairs can also be made by any competent technician. All the ICs are standard manufacturer's items and are also stocked by CYTEC. The relays are manufactured to CYTEC specifications and must always be replaced by the identical part number.

Mercury wetted relays can only be used in the vertical position and must be replaced in the same direction as the one removed, as indicated by the arrow on the relay.

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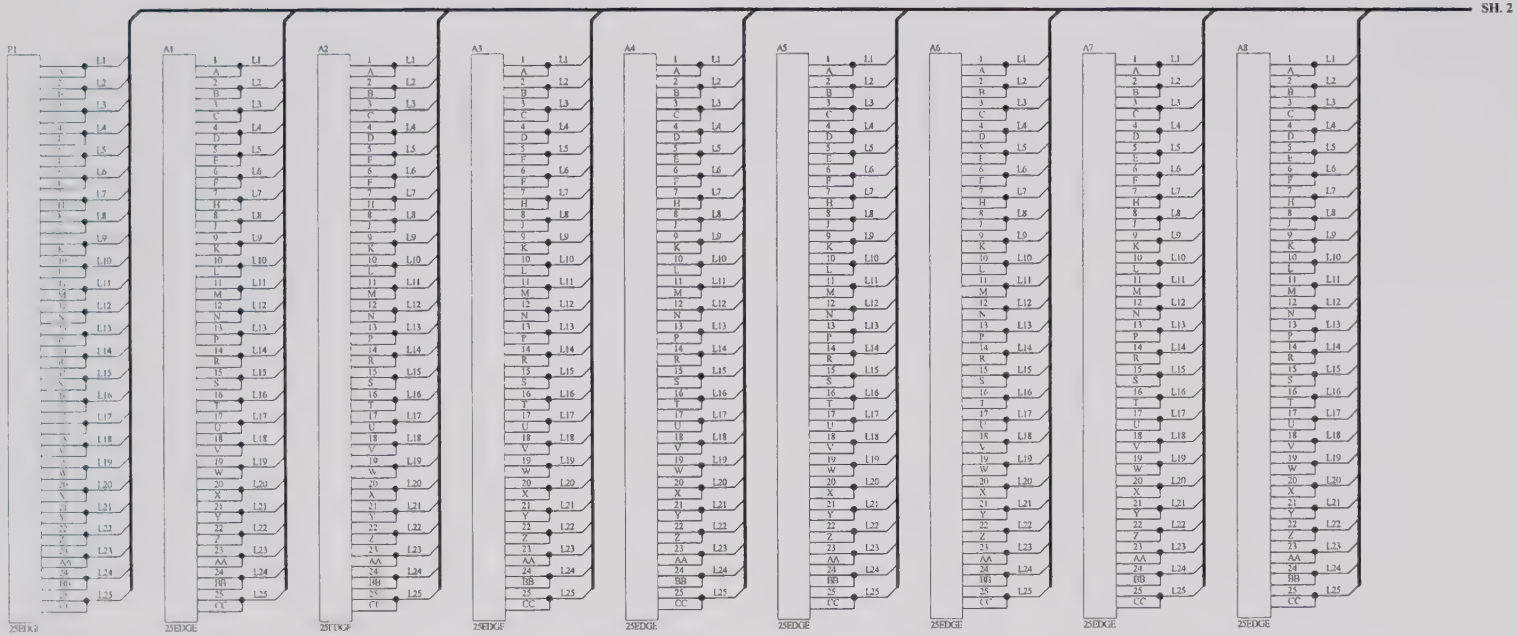
*** WARRANTY ***

CYTEC Corp. warrants that all products are free from defect in material and workmanship and perform to published specifications for five years from date of shipment. This warranty is in lieu of any other warranty expressed or implied.

The liability of CYTEC Corp. shall be limited to replacement or repair of any defective units which are returned F.O.B. to its factory. Units which have been subjected to abuse, misuse, accident, alteration, neglect, or unauthorized repair are not covered by this warranty.

No liability is assumed for expendable items such as lamps or fuses.

FOR TECHNICAL ASSISTANCE
CALL 1-800-346-3117

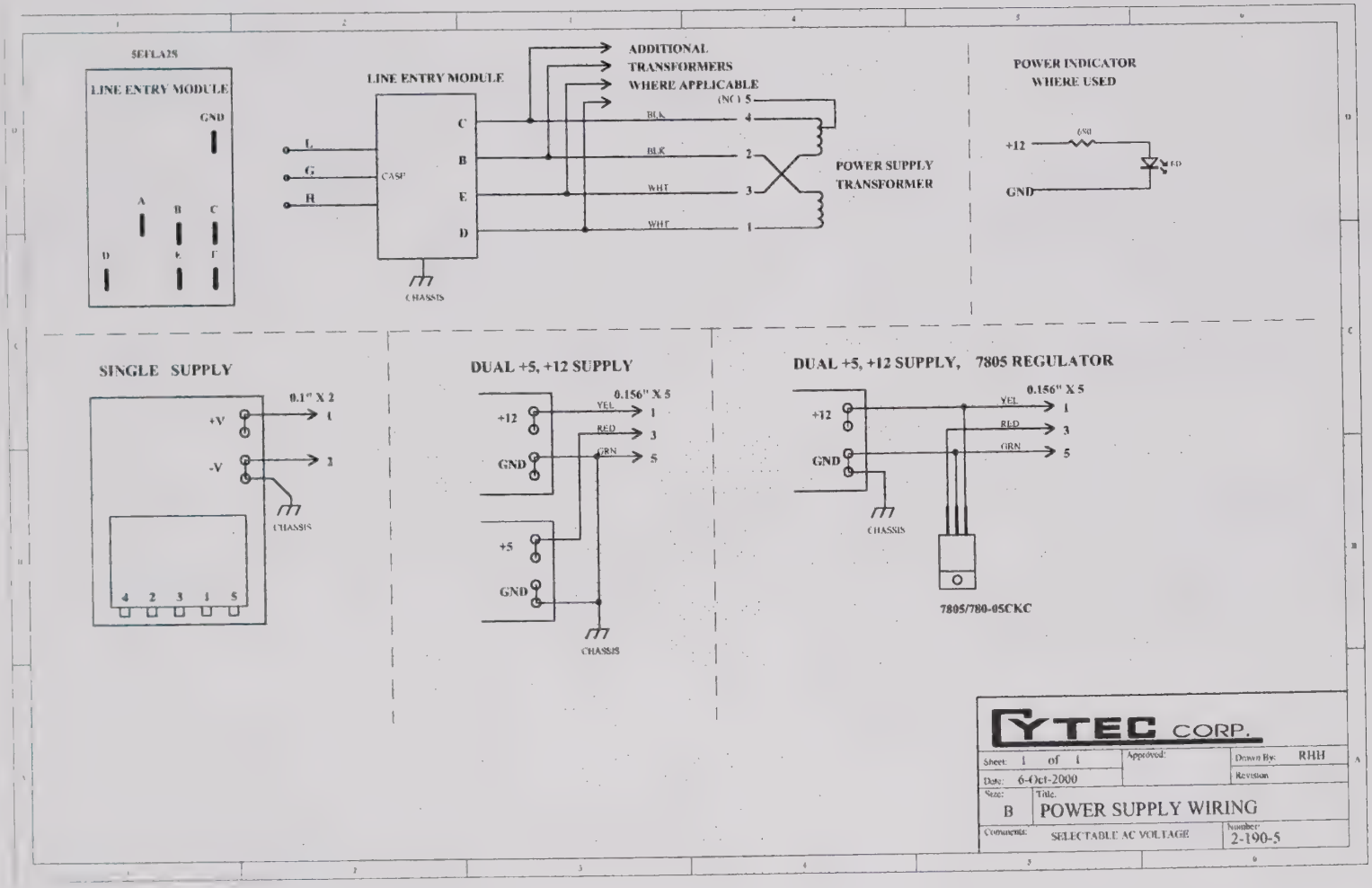


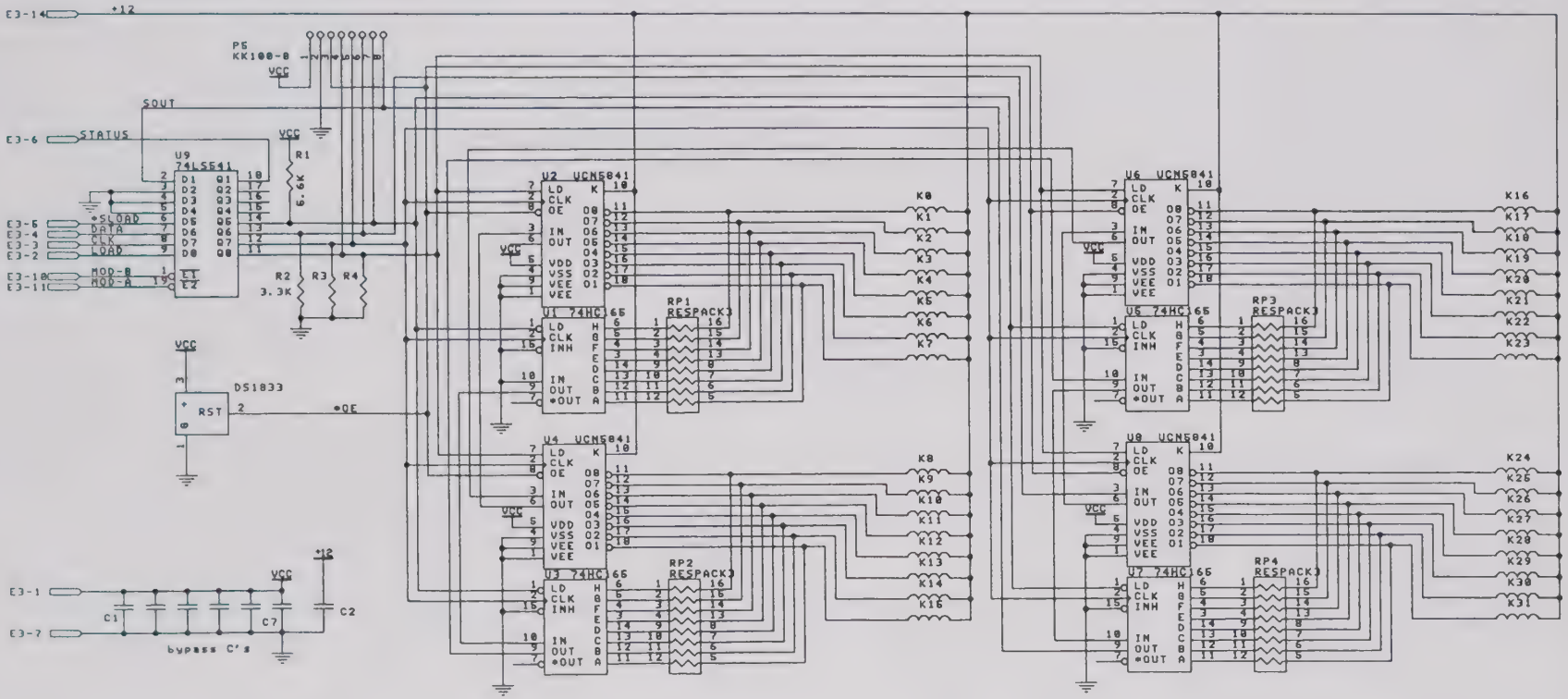
REVISED FROM

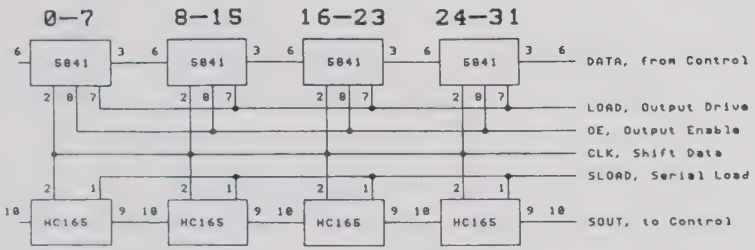
CYTEC CORP.		
APPROVED BY	DRAWING NUMBER	DRAWN BY RJB
DATE: 19-Dec-2002	2-077-1/1	REVISION:
SIZE: A3	TITLE: 22/25 PIN MOTHERBOARD	
2-077-1-01 SCH		SHEET 1 OF 2

REVISED FROM

CYTEC CORP.			
APPROVED BY		DRAWING NUMBER	DRAWN BY RJB
DATE	19-Dec-2002	2-077-1/2	REVISION
SIZE A3	TITLE	22/25 PIN MOTHERBOARD	
2-077-1-02 SCH			SHEET 2 OF 2


SEFLA2S
LINE ENTRY MODULE
GND
A
B
C
D
LINE ENTRY MODULE
L
G
N
CASE
C
B
E
D
CHASSIS
ADDITIONAL
TRANSFORMERS
WHERE APPLICABLE
(NC) 5
BLK
4
BLK
2
WHT
3
WHT
1
POWER SUPPLY
TRANSFORMER
POWER INDICATOR
WHERE USED
+12
680
LED
GND
SINGLE SUPPLY
0.1" X 2
+V
-V
1
2
CHASSIS
4 2 3 1 5
DUAL +5, +12 SUPPLY
0.156" X 5
+12
GND
YEL
1
RED
3
GRN
5
+5
GND
CHASSIS
DUAL +5, +12 SUPPLY, 7805 REGULATOR
0.156" X 5
+12
GND
YEL
1
RED
3
GRN
5
CHASSIS
7805/780-05CKC
CYTEC CORP.
Sheet: 1 of 1
Approved:
Drawn By: RHH
Date: 6-Oct-2000
Revision
Size: B
Title: POWER SUPPLY WIRING
Comments: SELECTABLE AC VOLTAGE
Number: 2-190-5





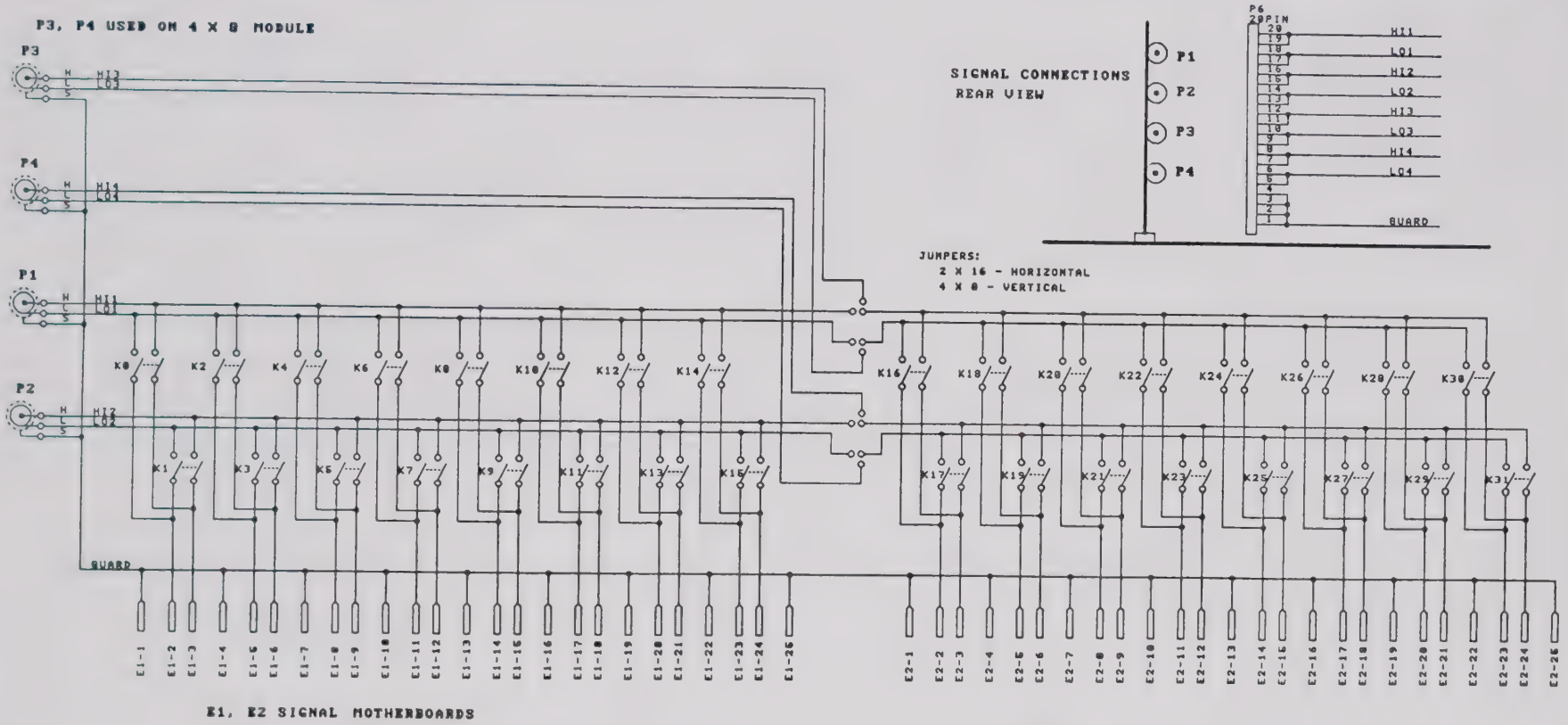
CYTEC CORP.

SCALE:	APPROVED BY	DRAWN BY	RHH
DATE 15-JUN-95		REVISED	A

PX/2X16 SWITCH MODULE

SHEET 1, RELAY DRIVE

DRAWING NUMBER 3-101-1/1



CYTEC CORP.

SCALE:	APPROVED BY:	DRAWN BY: RHH
DATE: 12-JUL-94		REVISED

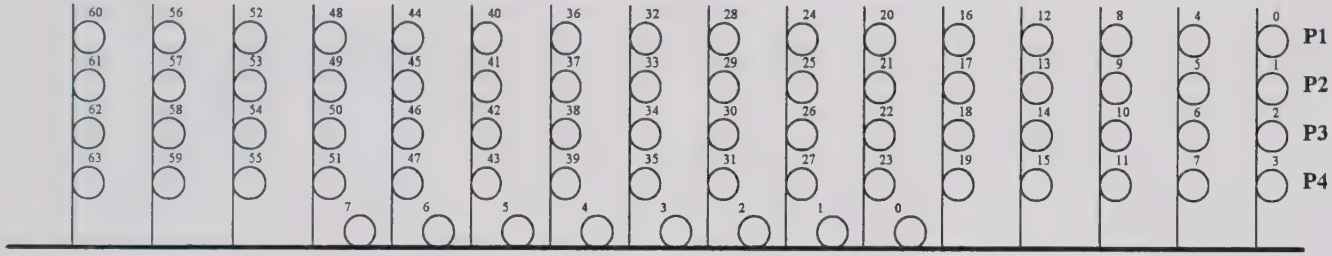
PX/2X16 SWITCH MODULE, 2 POLE

SHEET 2, SIGNAL CONNECTIONS

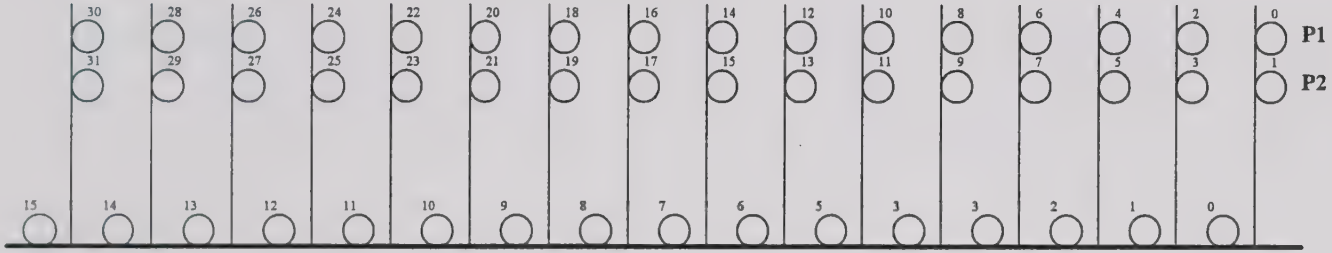
DRAWING NUMBER 3-101-2/2

BNC CONNECTIONS - STANDARD

64 X 8

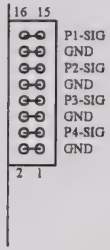


32 X 16

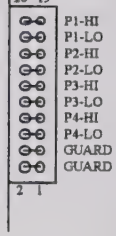


OPT. HEADER CONNECTIONS

-1



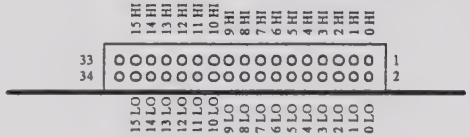
-2



OPT. HEADER CONNECTIONS, SIGNAL MOTHERBOARD

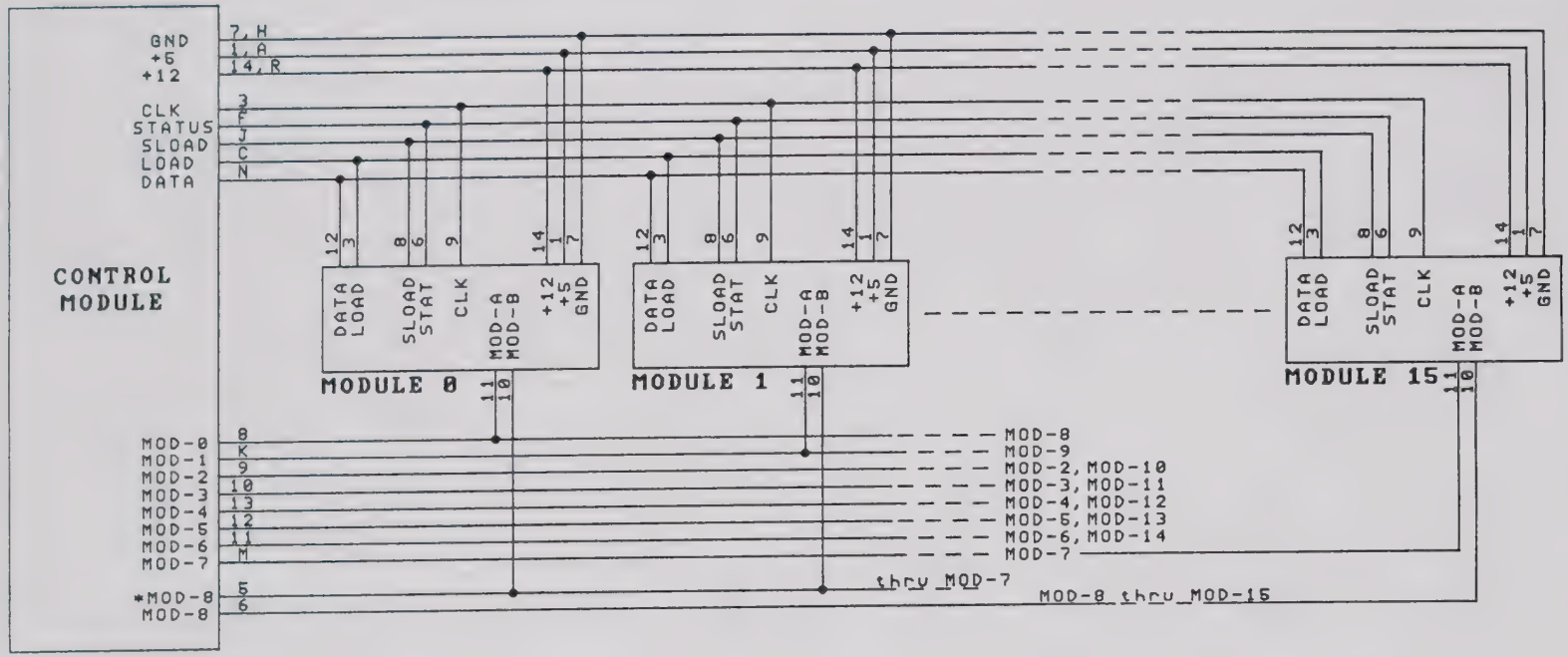
-1

-2


15 HI 14 HI 13 HI 12 HI 11 HI 10 HI 9 HI 8 HI 7 HI 6 HI 5 HI 4 HI 3 HI 2 HI 1 HI 0 HI
33 34 1 2
15 LO 14 LO 13 LO 12 LO 11 LO 10 LO 9 LO 8 LO 7 LO 6 LO 5 LO 4 LO 3 LO 2 LO 1 LO 0 LO

CYTEC CORP.

Sheet: 1 of 1	Approved:	Drawn By: KWG	
Date: 19-Jan-1999		Revision: A	
Size: A4	Title: PX/512 CHASSIS SIGNALS		
Comments:		Number: 3-102-2	



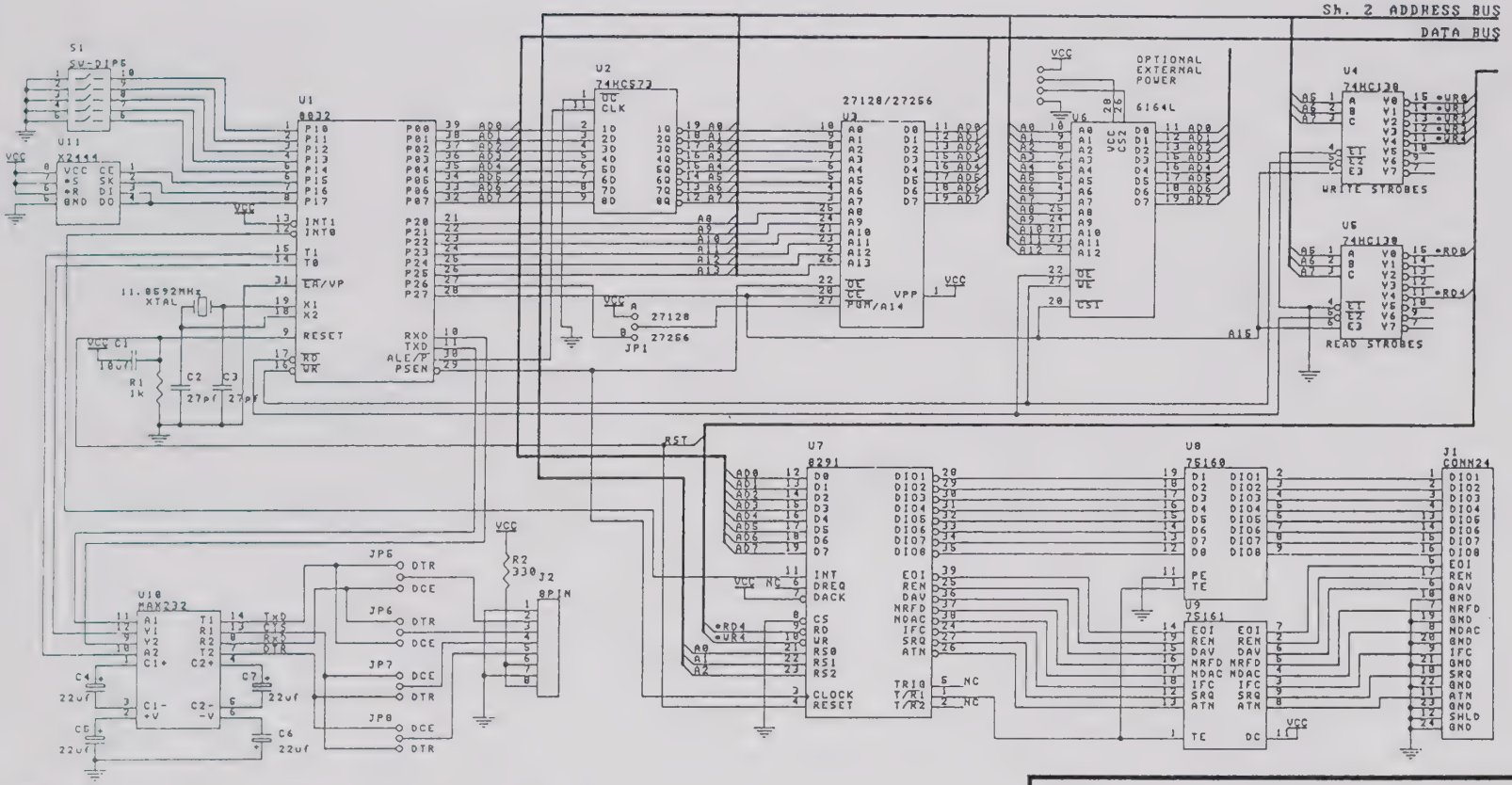
CYTEC CORP.

SCALE:	APPROVED BY:	DRAWN BY RHH
DATE: 31-AUG-92		REVISED

PX/512 CONTROL SIGNALS

DRAWING NUMBER 3-103

162435



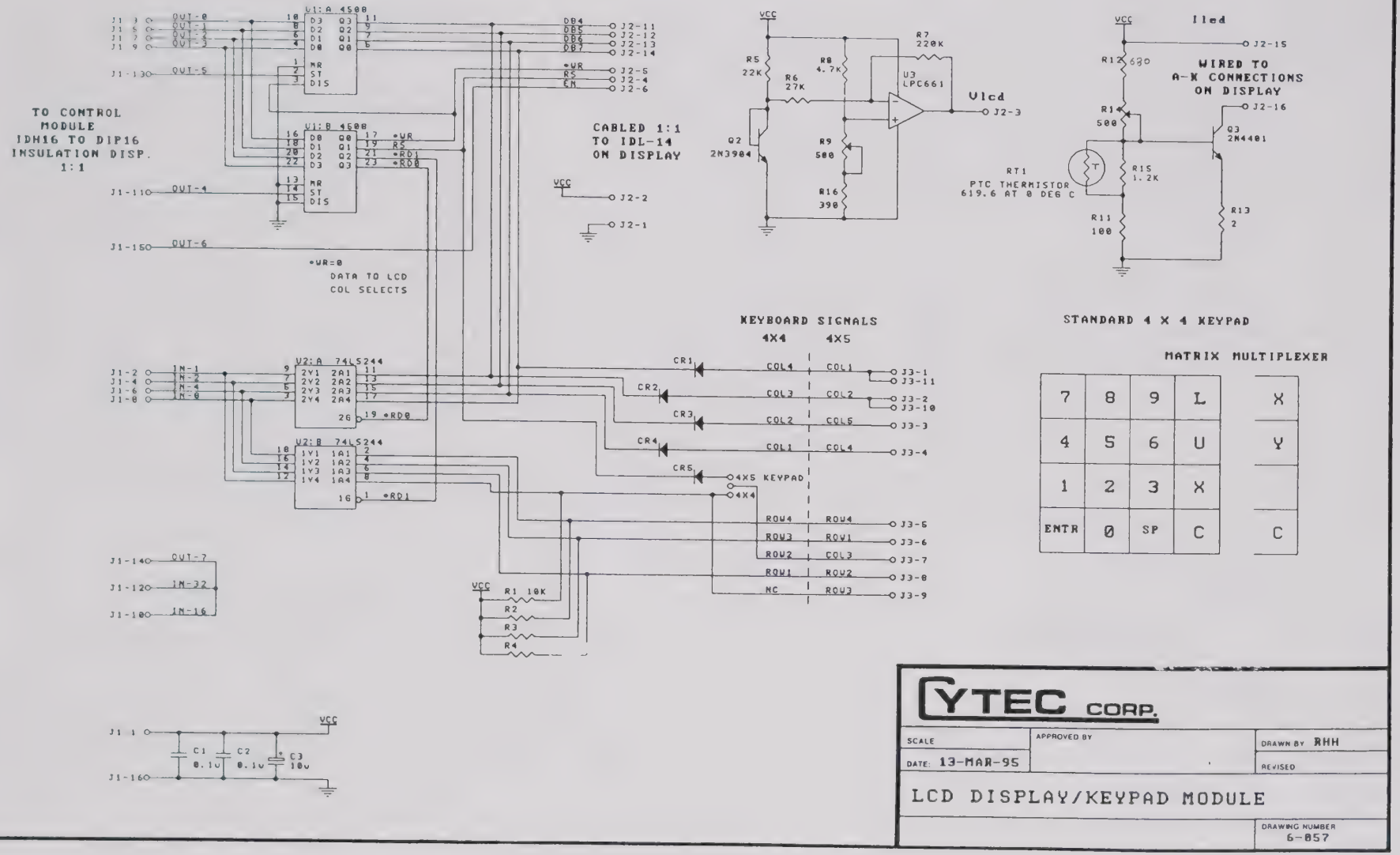
CYTEC CORP.

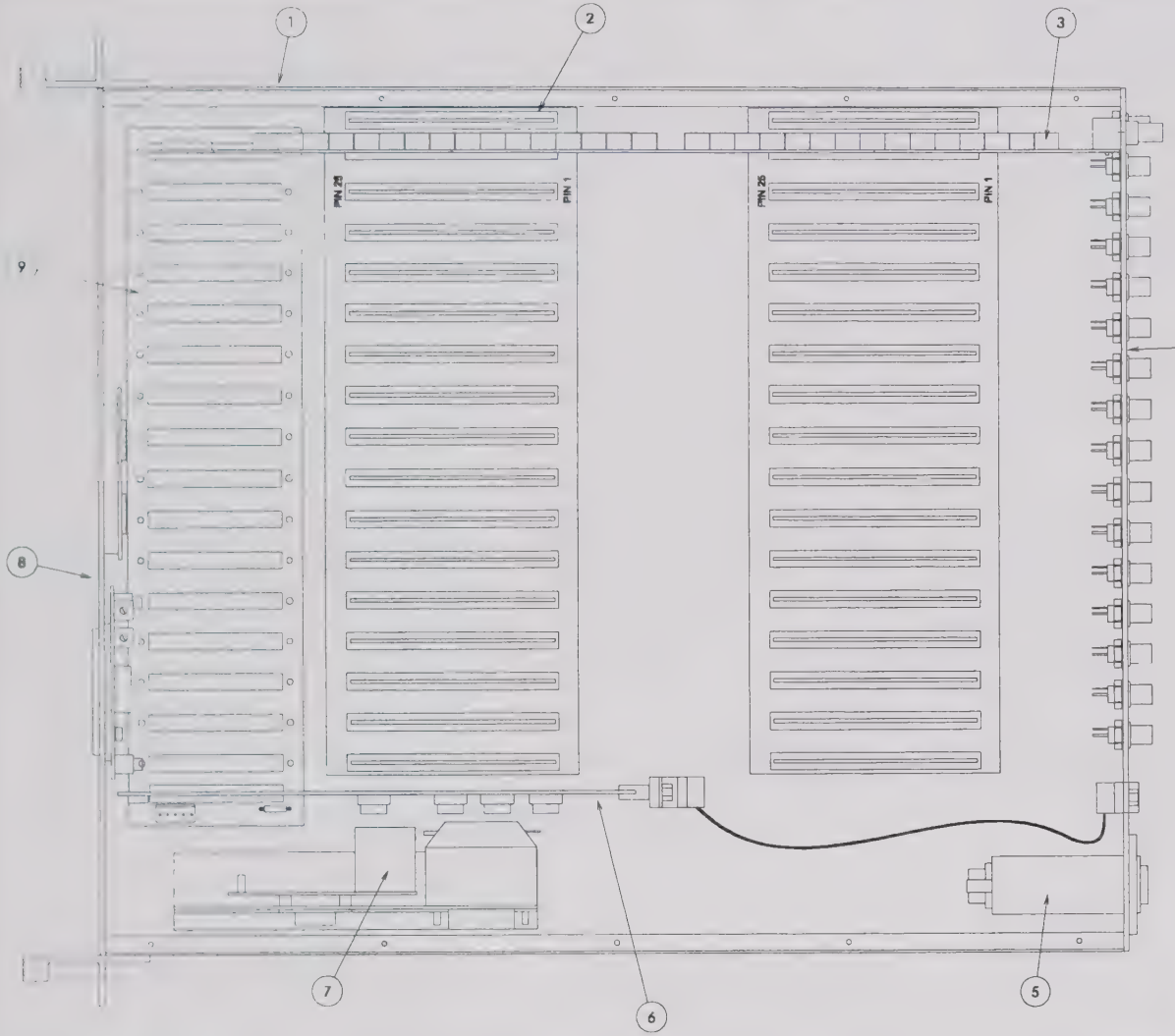
SCALE:	APPROVED BY:	DRAWN BY RHH
DATE 27-JUN-91		REVISED

RS232/IEEE488 CONTROL MODULE

Sheet 1 of 2 PX Drive Prof

DRAWING NUMBER 6-813-3


TO CONTROL MODULE IDH16 TO DIP16 INSULATION DISP. 1:1
CABLED 1:1 TO IDL-14 ON DISPLAY
WIRED TO A-K CONNECTIONS ON DISPLAY
DATA TO LCD COL SELECTS
KEYBOARD SIGNALS
4X4 4X5
STANDARD 4 X 4 KEYPAD
MATRIX MULTIPLEXER
PTC THERMISTOR 619.6 AT 0 DEG C
7 8 9 L X
4 5 6 U Y
1 2 3 X
ENTR 0 SP C C
CYTEC CORP.
SCALE
APPROVED BY
DRAWN BY RHH
DATE: 13-MAR-95
REVISED
LCD DISPLAY/KEYPAD MODULE
DRAWING NUMBER 6-857



1. 14-30-20 x 2U CHASSIS ASSY.
   20.22" DEEP x 19" WIDE x 3.5" HIGH
2. 2-077-1 MOTHERBOARD
3. PX/2x16-2 OR PX/2(2x8)-2 SWITCH MOD.
4. REAR PANEL PER CONFIG:
   - 33-08-21 BNC 32x16 or 2(32x8)
   - 33-09-21 BNC 64x8
   - 33-10-21 HEADER 32x16 or 2(32x8)
   - 33-11-21 HEADER 64x8
5. AC SELECTABLE POWER ENTRY
6. CONTROL IF-x PER ORDER
7. 12V-1.7A POWER SUPPLY
8. FRONT PANEL (LCD M.C. OPTIONAL)
9. 6-012-3 CL/128/256 MB

A	5/11/01	DR	WAS PRINT #3-108-1 & ADDED AC SELECT & MOVED P.S.

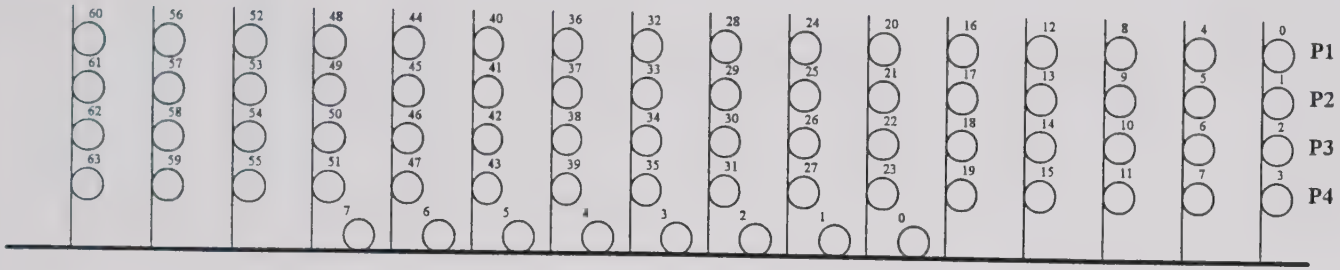
CYTEC CORP.

TOL. +/- .010" U.O.S.

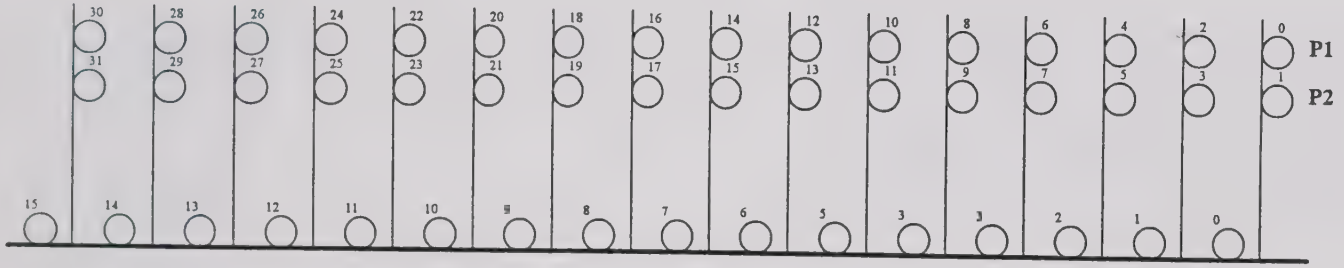
DATE 9/22/98	CAD FILE: 33-08-00.DW2		DRAWN BY: JAR
SIZE: D	TITLE: PX/512-2 MAINFRAME		
COMMENTS: BNC & HEADER CONNECTORS			DRAWING NUMBER: 33-08-00

BNC CONNECTIONS - STANDARD

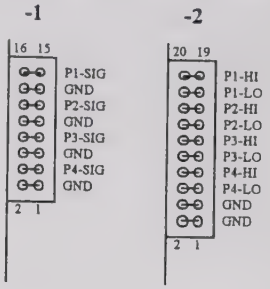
64 X 8



32 X 16



OPT. HEADER CONNECTIONS

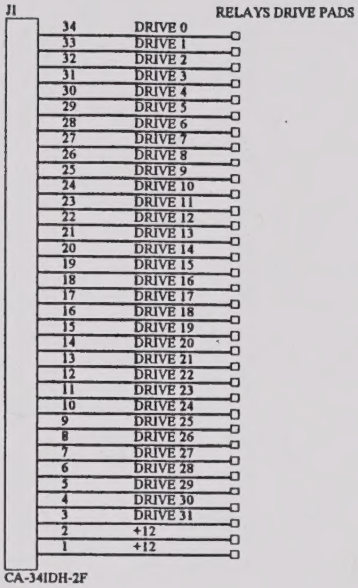


OPT. HEADER CONNECTIONS, SIGNAL MOTHERBOARD

-1
GND 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
33
34
1
2
EVEN PINS - GNDS
-2
GND 15 HI 14 HI 13 HI 12 HI 11 HI 10 HI 9 HI 8 HI 7 HI 6 HI 5 HI 4 HI 3 HI 2 HI 1 HI 0 HI
33
34
1
2
GND 15 LO 14 LO 13 LO 12 LO 11 LO 10 LO 9 LO 8 LO 7 LO 6 LO 5 LO 4 LO 3 LO 2 LO 1 LO 0 LO

CYTEC CORP.

Sheet: 1 of 1	Approved:	Drawn By:	RHH
Date: 27-Mar-1998		Revision:	A
Size: A4	Title: PX/512 CHASSIS SIGNALS		
Comments:		Number:	3-102-2



CYTEC CORP.			
Sheet: 1 of 1	Approved:	Drawn By:	RHH
Date: 9-Oct-1998		Revision:	
Size: A4	Title: PX RELAY DRIVE MODULE		
Comments:		Number:	2714-00-50